School Shop

FOR INDUSTRIAL ARTS & VOCATIONAL EDUCATION TEACHERS

vol. II no. 1

September, 1942

New Frontiers
by Gill Robb Wilson

Ball-Peen Kit
by Claude L. Booth

Vocational Schools and War Production
by George H. Parkes

Visualizing the Industrial Arts
by Chris H. Groneman

Tested Projects • Instructional Resources • News from Industry Personalities • Washington Letter

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SPECIFICATIONS

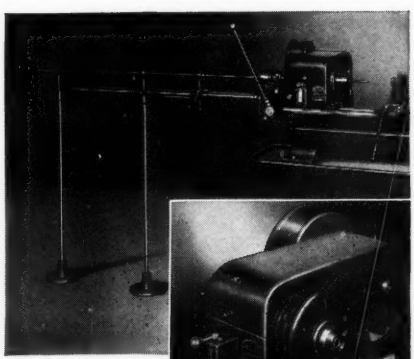
1 Swing Over Bed, 10½"
2 Bed Length, 43⅛"
3 Spindle Hole, 25/32", Capacity, ⅝"
4 Preloaded Precision Ball Bearing Spindle Mounting
5 12 Spindle Speeds, 30 to 1450 R.P.M.
6 Cross Slide Stroke, 3¼"
7 Six Position, Automatic Indexing Turret
8 Stroke of Turret, 3¼"

★ ★ ★

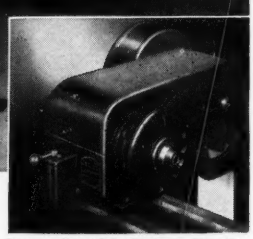
NO 830 LOGAN ⅝" CAPACITY HAND SCREW MACHINE

THE NEW LOGAN TURRET LATHE MEETS SPECIFIC NEED FOR WAR PRODUCTION

The recently announced Logan Turret Lathe was developed to supply the demand for a durable small hand screw machine capable of accurate, continuous production. Small parts made from bar stock of ⅝" diameter and less can be turned out with the same speed and precision as that of larger machines and thus release the latter for heavier work. Built to rigid and exacting specifications and the same high standards as the other lathes in the Logan Line.



The Logan Bar Feed is offered as an accessory for the No. 830 Hand Screw Machine. Maximum capacity, ⅝" round stock. Maximum stroke, 2". Patented safety cam action locks collet and operates bar feed



The Logan Speed Collet fits the No 830 Lathe or others with a 1½" x 8 thread spindle nose feed. Quick acting. Positive squeeze grip No keys or wrenches needed

LOGAN ENGINEERING COMPANY • Chicago, Illinois

Logan

A NAME TO REMEMBER WHEN YOU THINK OF LATHES

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Highlights of Coming Issues:

1. "A General Education Program Serving Youth's Vocational Needs."
2. "A Photo-Enlarger as an Instructional Unit."
3. "The School Print Shop Aids the War Effort."
4. Shop-Tested Projects.
5. And these regular features: Instructional Resources; Shop Training for Victory; Washington Letter; and others.

Don't Miss Them!

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School Shop

FOR INDUSTRIAL ARTS & VOCATIONAL EDUCATION TEACHERS

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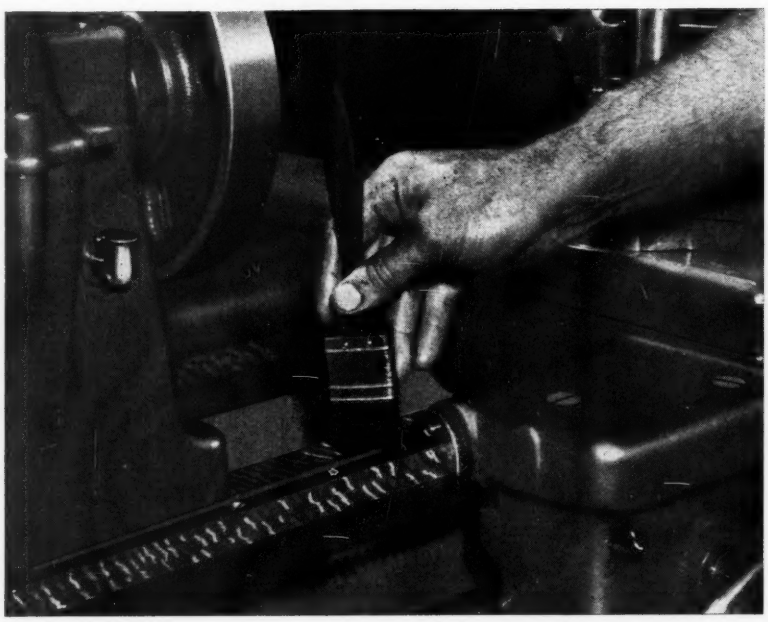
HOW TO GET THE MOST OUT OF YOUR LATHES

No. 1 in a series of suggestions made by the South Bend Lathe Works in the interest of more efficient war production.

Keep Your Lathes Clean

Yes, it's as simple as that. Just by keeping your lathes (and other machine tools) clean, you can increase production, reduce scrap, and lengthen the life of your equipment.

This will not only benefit you, but it will be a definite contribution to our total war effort. For every available machine tool must be kept going. The combined output of all machine tool builders cannot supply enough equipment to keep pace with the rapidly expanding war production program, so there can be no unnecessary replacements.



A small paint brush is convenient for brushing away dirt and chips

Dirt Is Abrasive

Unless brushed away frequently, the scale, grit and fine chips produced by the cutting tool mix with the oil on the bed ways, dovetails and other bearing surfaces, forming a dirty sludge. Because this dirt is abrasive, it increases friction and causes wear wherever it is allowed to collect.

Obviously, this retards production, shortens machine life, and makes it hard for the operator to maintain exacting tolerances. And when chips work under the tailstock or saddle, or into the spindle taper, the accuracy of the lathe may be seriously impaired.

Encourage the Operator

A good way to keep your lathes clean is to encourage each operator to take care of his own machine. Let him know that you appreciate his interest and effort. Explain how easy it is to spot a good machinist by the way he takes care of his lathe. Urge him to take pride in keeping his lathe clean, free from dirt and chips. He will have greater respect for his job and will unconsciously become a more careful workman.

A small paint brush is convenient for brushing away loose dirt and chips. Compressed air is not so good because it may blow dirt and chips into oil holes and bearings. Pliers are handy for pulling long steel shavings away from the machine. A clean cloth can be used, after brushing, to remove the last traces of dust and grit. A little oil on the cloth will prevent rust from forming on the finished surfaces of the machine.

The felt wipers on the ends of the saddle wings should be removed and cleaned in kerosene occasionally. An experienced machine tool service man should periodically inspect the lathe and remove any grit or chips that may have worked under the saddle or tailstock. The bed ways can be badly scored by a small steel chip imbedded in the saddle or tailstock base.

Don't Let Chips Collect

Adequate chip disposal should be provided to prevent chips from piling up underneath or around the lathe. Dirt and chips should not be allowed to work into the threads of the lead screw or the gearing of the apron or quick change gear box.

At a time like this, when most machine tools are operating 24 hours a day at speeds and feeds far beyond those for which they were designed, a small amount of carelessness may cause excessive wear — even a breakdown. Certainly an ounce of prevention is now worth far more than a pound of cure.

Write for Bulletin H1

Bulletin H1 giving more detailed information on the cleaning and care of the lathe will be supplied on request. Reprints of this and other advertisements in this series can also be furnished. State number of copies wanted.

SOUTH BEND LATHE WORKS

Dept. 918 **South Bend, Ind., U. S. A.** **Lathe Builders for 35 Years**

Douglas C-54 cargo plane—the largest, fastest, and most important contribution to the war effort for its particular job; used for carrying both troops and freight.

New Frontiers . . .

BY *Gill Robb Wilson*, PRESIDENT
NATIONAL AERONAUTIC ASSOCIATION

THE STUDENT who is today preparing for a place on an aviation production line is preparing to grow roots in the soil of a new world. He is preparing to take his place in the ranks of pioneers who will build the greatest transportation medium ever known to man. For who rules the air will rule the world and wherever there is sky, man will project his destiny swiftly through it to the land beneath.

However much the extremes of aerial activity necessary to military use may curb the greater utility possible to flight in the commerce of peace, the impression aviation has made as a decisive power in warfare is but the shadow of the greater significance it will have in the post-war period.

To the young man and woman preparing to enter the now vast aeronautical industry, there must surely come a question of doubt as to the security to be found in a field which has grown in four short years from a foundling that employed but 25,000 men to become the largest employer of factory labor in the United States. Is this a "war baby" that will become a ghost industry after the armistice? Will all of these hundreds of thousands of men be thrown out of work when the urgent need for bombers and pursuit planes is at an end? What will become of the great Willow Run plant, the vast Douglas production lines, the Curtiss-Wright industries, and the mile on mile of plant facilities now racing against time to provide the vitally needed machines of air power?

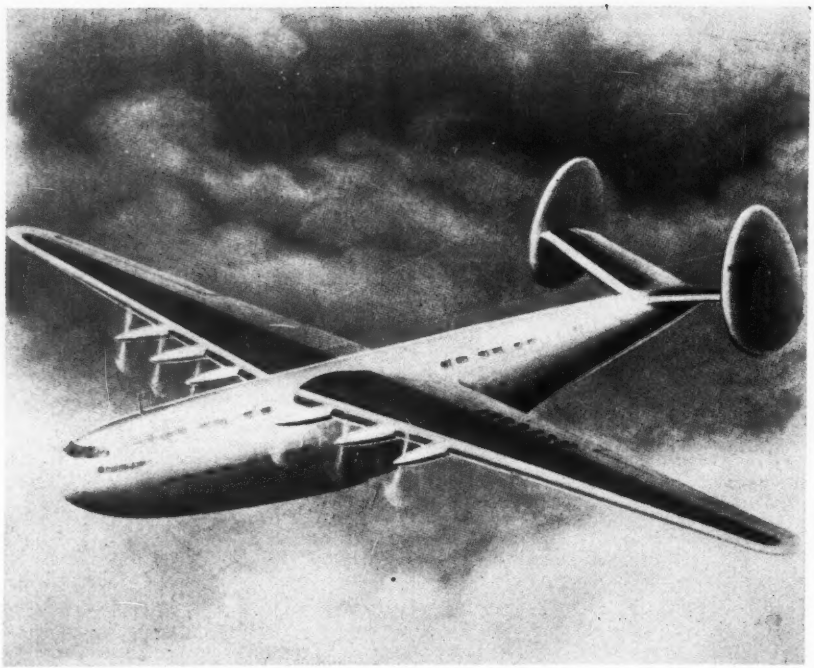
The educator's answer to these problems will be found in a true conception of the economics of aviation and the significance of a world compacted into a community by the medium of air transportation.

Today in the skies of the world, the aerial battle is but a preview of the drama of commerce. Combat aircraft move at 400 miles per hour . . . thirty thousand feet above the earth. These are the couriers of the commerce of tomorrow. Today the great bomber bears forty thousand pounds of death a third of the way around the globe without a pause in flight; and its sister flying boat . . . three decks deep and capable of carrying scores of passengers . . . can wing to Europe and return without alighting on the waters between.

To understand the significance of the future of air commerce, one must first realize that in military science, the airplane appears in its least economic role. Military requirements and the weight of armament will be unnecessary in commerce.

Cargo, as in all other forms of transportation, will form the economic foundation of our air transportation indus-

The war is forcing advancements in aviation for which we would perhaps have waited a long time. Here is a forecast of the future and a discussion of how students today may fit themselves into the aviation picture of tomorrow by a man whose association with aviation dates from participation as a flyer in World War I.



Glenn L. Martin's new design for a 250,000 pound sky leviathan—able to carry 102 passengers, each with 80 pounds of luggage, plus 25,000 pounds of mail and cargo to London in 13 hours. As commercial vessels, for which the design was drawn, these planes would rival, in a year of operation, the payload capacity of surface ships. As military transports, such ships could carry large numbers of troops and heavy supplies.

try. A great percentage of the cost of ground transportation is the investment which must be made in the development and maintenance of the right of way. Air commerce is free from all of this expense. Highway, rail, and marine crews must be constantly kept at the work of repairing bridges, dredging channels, laying track. The airplane operates in a free medium of air space. Even the abandonment of trackage is an expensive and lengthy operation for the railroads. An airliner merely turns its nose to the new destination. The airplane is even rid of the friction which is an expensive maintenance and operating problem of the surface mediums of transportation.

There will be periods of extreme bad weather when air commerce will not move without interruption but when these brief periods of "grounding" are over, the airplane need wait no longer as must surface transportation for the repair of trackage or bridges which have been washed out or destroyed by storms. In other words, the interruptions to air commerce will be less than those to either land or seaborne cargo.

It is perhaps difficult to envision the economies of air cargo when the present air express rates which we have had to meet are known to average 86 cents per ton mile (1 pound 2000 miles). However, the first of the cargo planes being built for military use is capable of operating 1500 non-stop miles, at 230 miles per hour, carrying 8 tons of cargo, for an overall operating cost of 7 cents per ton mile. Add to that the cost of pickup, delivery, etc., and an average cost of air cargo operation is seen to exist *today* at approximately 10 cents per ton mile! When we see that present surface rail express moves at 46 miles per hour for 15 cents per ton mile, it doesn't take a mathematical genius to figure where our merchandise is going to travel when air cargo equipment rolls off the production lines.

Who bases his idea of the future of aerial transportation on present equipment or even on the rate of speed or economy of operation achieved over the last decade, has little faith in the ingenuity of man. Anyone who thinks that the passenger will travel the skies at 300 miles an hour and place no comparative value on the speeds at which his merchandise travels has not studied the history of transportation. Anything which is grown or produced anywhere on the face of the earth will be yours within 24 hours of your order.

The tremendous impetus which is being given the development of cargo-carrying aircraft due to the immediate and urgent need of supplying our far-flung battle lines, will pave the way to the inevitable era of air commerce. However, it is not in the field of domestic commerce that the aircraft will make its ultimate supreme accomplishment. Through flight, the time travel factor between the capitals of the world has shrunk to one-fifth of its former mark. In other words, the globe has been compacted to community status. The boys who are today fighting the aerial battles over Australia, India, Africa, Iceland, and Alaska, or wherever the wings of air power may carry them, will be able to tell you something of this new world community when they return. London isn't 5 days by steamer, or even 44 hours by air as we knew it on the Hindenburg . . . it's only 8 hours average run as they've been doing it in the thousands of bombers they've ferried across during the past two years. Hong Kong isn't 23 days from San Francisco . . . it's only 23 hours by air. Ten years ago, Fairbanks, Alaska, was 14 days from New York. Today it is 27 hours by scheduled airline and the travel cost is actually less.

After the war, there will be the greatest movement of people across the face of the earth ever known to man. Wearied unto desperation with politico-social maneuvers, government in business, bureaucrats, and dictators, the immigrant of tomorrow will move from the crowded areas into the vast, uninhabited regions of Canada . . . the unsettled agricultural areas of Southern Rhodesia, Brazil, Australia, the Argentine . . . to the lands of potential industrial growth in India, Chile, and Bolivia . . . to the lands of new hope and promise.

And air commerce will move them as did the immigrant ships and trains of yesterday. The Conestoga wagon will throw a shadow on the earth beneath as it crosses the mountain ranges to fertile interiors at two hundred miles an hour. The immigrant will go the more readily this time for through the medium of air transportation, he will never be far from home through the sky. The aviation industry of the United States must be the builder of the covered wagons which transport the swarming millions and must be the provider of the small aircraft the immigrant will use for travel about the locality of his new home and must maintain the aerial highway over which his produce will move.

Where yesterday world travel was the privilege of the few, tomorrow it will be the commonplace activity of all. Aviation will be the cheapest form of transportation ever known to man. Just as today you are familiar with the cities of Chicago, New York, and San Francisco, so tomorrow you will ultimately know the Main Streets of Calcutta, Melbourne, Buenos Aires, Santiago, and Moscow.

By entering the race for aerial supremacy, the government of the United

States is committing itself to the greatest all-out government subsidy of an industry in the history of the world. Today, the aviation industry is the largest factory employer of labor of any industry in the nation. And therefore, will be the greatest single reason for employment or unemployment in the post-war period. The present plant facilities will not close down after the war. The nation's investment in men and money must be maintained. Bomber production lines will be revamped to meet the needs of air cargo in peacetime commerce. Hundreds of thousands of new pilots will return to peacetime lives to demand a continuance of the speeds of transportation to which they have become accustomed. The private plane will become as commonplace as the present automobile.

In planning a career, a young man or woman must consider the significance of a world in which the tempo of air commerce has not merely speeded up all transportation of passengers and cargoes, but in which the economic, social, and political problems have been radically changed. Air commerce will create a vast volume of new business. Much cargo will be moved on a world-wide scale that has hitherto moved only locally. Perishable goods will have a much wider distribution. Retailing will be done on an international basis. The complexities of doing business internationally will be in great measure abolished.

School Shop's *Second Year*

With this issue, SCHOOL SHOP enters volume two. When we look back at Pearl Harbor and priorities, Manpower Commissions and munitions, we are grateful for the progress we have made. Thanks are due in several directions.

First, may we express to SCHOOL SHOP readers our appreciation of their interest and support. Their commendation and constructive criticism have been most heartening.

To the Editorial Advisory Board—many thanks. With no personal interest, financial or otherwise, in SCHOOL SHOP except that of being of service to the profession, they have given helpful counsel throughout the year.

The Consulting Editors, Marshall Byrn and Thomas Diamond, have given unstintingly of their time and exceptional abilities so that SCHOOL SHOP might be a professional journal of the first water.

Finally, to the advertisers who make SCHOOL SHOP possible by their loyal support, a most grateful expression of appreciation is extended.

And now what of the immediate future?

The first call on school shops is to do everything within their power to aid in the war effort. Training of workers for war industries is item one on this program. Actual production of war items may be asked of schools in increasing measure. Aviation fundamentals for both air crew and ground crew must be stressed.

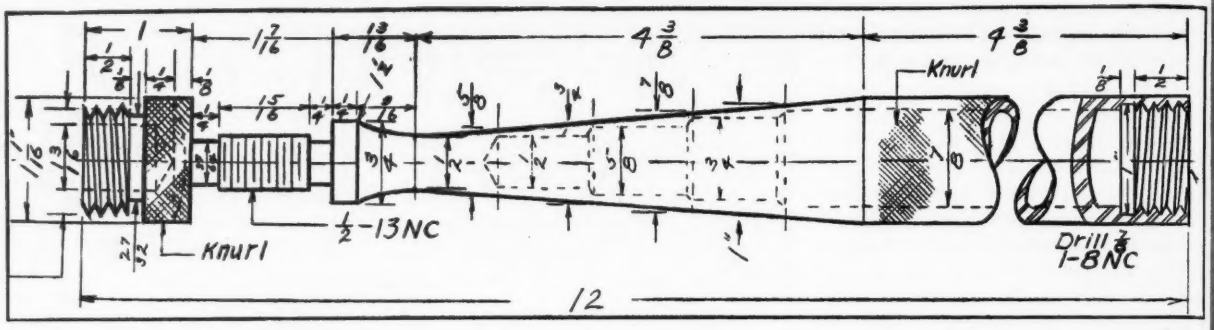
Yet for youngsters generally a program must be maintained that will give them the knowledge, the abilities, and the attitudes that will stand them in good stead in the vast new industrial world to come.

SCHOOL SHOP pledges its best to help shop teachers cover all of these responsibilities throughout the year ahead.

At least sixty cents out of every dollar in the aviation world will be earthbound. The vast majority of jobs in aviation will be in maintenance and manufacture and traffic management. The young man who goes into the shop today and learns to deal with the forces of maintenance will be the key man in tomorrow's transportation. Whoever is able to employ a combination of mental and manual skills will have the greatest security. Plastics and stainless steel will be the fundamental fabrics with which aviation will work. The boy who comes out of high school without the development of manual skill will find himself as much handicapped as in the past his father found himself handicapped without a broad general educational background. As we move into greater degrees of technology we increase the importance of manual skill.

It is more than a happy accident that most manual training rooms are set up in the basement of the average school building. That is where they belong for they are a part of the foundation of a liberal education for the future. The educator who is today preparing young men and women for careers in aviation is equipping the pioneers for the post-war frontiers. Let the young aviation machinist dig his roots deep into the soil of this new industry. Let him know the security and the satisfaction he will have when his job of building the battle-wagons of air power is over and he may turn to building the Conestoga wagons of a new world.

At left, rugged twin-engined Curtiss AT-9's for the Army Air Force, and at right, single-engined Curtiss SNC-1's for the Navy, roll off the production lines side by side, day and night, as shown here in a new airplane plant of Curtiss-Wright Corp. "somewhere in the Middle West." Planes are entering final assembly in the background and move along the floor tracks to emerge in the foreground as completed warplanes. (Photo approved for publication by War Dept.)



Project of the Month:

Ball-Peen Kit Features Economy in Materials

BY *Claude L. Booth*

This one project includes an unusual number of machine-shop technics, while using very little material in its construction. Claude L. Booth teaches at the Anaheim, California, Union High School.

FACED as we are with the responsibility of training workers for the nation's war program, and with the necessity for careful use of materials, machine-shop teachers today must consolidate as many experiences as practical in a project. Thus we can get the most out of the material used.

Here is a new approach to the old assignment of the ball-peen or machinist's hammer kit. It offers the beginning machine-shop student an opportunity to learn many fundamental operations. The completion of this project is secondary to the introduction of processes and operations, several of which have been made more difficult than necessary through intent and design, to accelerate thinking and calculating of allowances. The kit customarily includes a chisel, center punch, scriber, and hammer. Only the last is described in detail.

Centering and center drilling round stock for between-center work, straight turning, finishing, and knurling are among the first group of fundamentals covered. Others include taper turning (attachment, compound rest, and tailstock set-over), curve turning, drilling and counterboring, threading (inside and outside with tap and die, as well as with cutter-bit and boring-bar), and forging, tempering, and hardening.

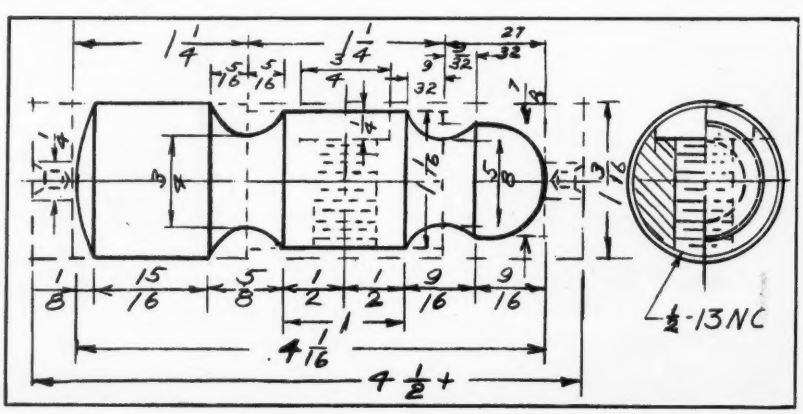
Material includes four pieces of round stock: a cut of cold rolled or annealed axle stock 1⅛" x 12" for the handle, a piece of tool steel or axle stock 1¼" x 4½" for the head, two pieces of ⅜" x 3½" octagon tool steel or drill rod for chisel and punch, and a ⅛" x 3½" drill rod or steel wire for scriber.

The hammer handle is made of cold rolled or annealed axle stock to make for less difficult drilling, while the head requires annealed tool steel or axle stock that will take sufficient hardening. Serving as a bench project, the chisel is forged, finished and tempered. The center punch and scriber are finished as lathe projects.

Breakdown of operations:

FOR THE HANDLE

1. *Use of power saw*—select stock for handle, cut to length.
2. *Facing*—face both ends in three-jaw chuck, using automatic cross feed.
3. *Centering*—lay out centers with scale, center attachment, and scriber. Center punch both centers. With drill chuck in headstock and work supported by tailstock center, drill and countersink, using compound for center support.
4. *Straight turning*—attach dog and drive between centers, finishing to 1 1/16" for 4½" (leaving ⅛" on one end for finish facing after threading). On other end, finish for 1¼".
5. *Knurling*—knurl both ends, noting feed and speed.
6. *Tapering*—set the taper attachment on compound tool rest, or set over the tailstock to cut a taper of 1 9/16" to the foot, cut a taper for 4⅜" to ½" diameter (starting on knurl), 4½" from end.
7. *Straight turning and parting*—reverse dog to other end, protecting knurl with a piece of copper. Turn to accurate ¾" from end of taper to knurl 1¼" from other end. Turn curve on 9/16" section. ¼" from curve and next to knurled plug, part to 27/64 for tap drill size 3/16, ¼" wide. ¾" from end of plug, part 3/16, ¼" wide to ⅞" for top drill size.
8. *Threading*—prepare both sections for threading, and thread. Plug knurl is to be same as handle.
9. *Cutting*—after threading and drilling the handle, cut off plug.
10. *Drilling*—put handle in three-jaw chuck (protecting knurl with cop-



THIS Practical Shop Bulletin will keep you in touch with latest Industrial Shop Developments

TOOLING TIPS
SPECIAL SET-UP AT 1/4 THE COST
Ingenious Use of Drill Press Heads Solves "Special Machine" Problem
Cutting Tool Room Costs

"Tooling Tips" is a condensed, up-to-the-minute report of the latest machine tool short-cuts, ingenious special set-ups and new adaptations of machine tools.

This bulletin was originally prepared exclusively for the plant man who demanded practical information with photographs and full details about the new medium weight machines that have been adopted by industry by the hundreds of thousands. However, it also serves as a valuable aid to the shop instructor by making available to him the same vitally important information that goes to shop executives out in the field; by keeping him in touch with actual operating conditions of the machines his students will use in actual industrial work and by enabling him to tie in with the war production program. The shop instructor who receives this bulletin will be as well informed about the newest machine tool installations as the men in industrial plants.

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per). Drill. Start top in lathe for alignment. Finish in vise.

11. *Threading*—thread as in drawing. Use die for standard in cutting plug, not to cut the threads.

12. *Finishing*—screw plug into handle and finish end of plug.

FOR THE HEAD—

13. *Centering* — prepare stock for head for work between centers, same as for handle.

14. *Straight turning*—turn stock to 1 3/16" diameter to dog. From end of stock make a mark in from the end equal to the depth of the center hole. Then measure off 1¼" from the first mark and make a second mark.

Reverse dog and finish to 1 1/16" diameter. Measure 1 19/32" from second mark and make a third mark. Finish to ⅞" from end to third mark. From third mark, lay off 27/32" for peen. Lay off and finish semicircular sections. Finish outside of rest of head. Then finish crowned face and peen to ¼" diameter.

15. *Sawing*—saw off end center sections.

16. *Finishing*—finish ends of head in three-jaw chuck.

17. *Layout*—lay out drill.

18. *Counter boring*—counter bore.

19. *Threading* — thread head with numbers 1, 2, and 3 taps.

20. *Hardening*—harden head.

21. *Refinishing*—refinish the head.

Note: The center section of the head can be flattened on the two or four sides of the center section to the same size as the largest semicircular section diameter in the miller or shaper, if desired.

Alternatives: There are two possible threads for the plug. First, students with limited time can cut threads 1" NC 8 with tap and die, starting the tap in the lathe for alignment and using a die on the plug only as a standard to cut to and not with. Second, and for more advanced or ambitious students, a thread 21/32" x 16 is used that should require some calculation as to root diameter (tap drill size equals $O.D.-\frac{1.0825}{N}$, where N equals number of threads per inch).

Another alternative is not to run the thread all the way through the head. This gives a better looking head, but does involve more work.

Much difficulty will be experienced in the use of the parting tool in cutting to the thread diameters for start and stop of the cutter bit when threading, unless the operator prepares and sets the tool properly, and also uses the proper feed, speed, oil, etc.

Blueprint Reading vs. Drawing

IN VOCATIONAL SCHOOLS

BY ***Benjamin J. Stern,*** INSTRUCTOR OF DRAWING
NEW YORK VOCATIONAL HIGH SCHOOL

THE making of a skilled worker is not merely a matter of teaching the aspiring beginner the proper use of the tools of his trade. Before he attempts to manipulate these instruments, it is necessary for him to read instructions couched in technical terms, examine and interpret pertinent blueprints or drawings, and perhaps go through extended mathematical computations.

The engineer and professional technician needs to learn thoroughly the making of mechanical drawings, as well as the mathematics and science underlying them—a need which engineering colleges recognize and meet with drawing courses. For the mechanic, however, the first essential is not to learn to *create* but to learn to *read and interpret* the related technical drawing of his particular trade. From my experience and observation, it seems that this essential divergence in needs has been lost sight of in the related drawing taught in our vocational schools.

As a rule the teaching of technical drawing follows the pattern set in our general or academic high schools which prepare for college or engineering schools. This course of study is satisfactory enough for the youngster who has four years to spend on secondary education and looks forward to continuing in college. With this amount of time at his disposal, the student can go through an extended, thorough, and leisurely curriculum in mechanical drawing that lays emphasis on acquiring the manipulative skills in the fashioning of technical pictures.

Our vocational schools, however, are organized on radically different premises than those of the academic high school. The student here rarely has four years to devote to secondary education, nor can he look forward to any college or professional training. He must have as complete a training in as short a time as possible so that he may go to work.

It is obvious, then, that the average pupil in a vocational school has but a limited time to acquire the highly important related or technical drawing of his particular trade. Few students stay in the New York vocational schools longer than two years, and in the first, or try-out year, state regulations specify that the student is to be given the necessary trade drawing. As a result the aspiring mechanic has on the average but one full school year in which to learn his mechanical drawing under the instruction of a specialist in that field.

In view of this it seems to me a waste of time and energy to attempt to follow the usual curriculum laying emphasis on the creation of technical drawings. To best utilize the limited time available and give the trade student some ability to read and interpret the drawings of his trade, I should propose the following plan of work:

Since the 10A and 10B terms are important ones, constituting the first full trade training year for the average vocational student, I should utilize them as follows: 10A term—to be devoted entirely to a course in blueprint reading and interpretation; 10B term—to be devoted entirely to a course in shop sketching on cross-section paper.

Of course this breaks entirely with the traditional course of study in mechanical drawing. A term's work in blueprint reading, however, is just what the boy needs, acquiring thereby fundamental related knowledge that will stand him in good stead if he is forced to leave school at the end of the second year. Following this up by shop sketching puts into practice the first term's work and gives the learner enough grasp of the fundamentals of drawing to enable him to make acceptable sketches of mechanical apparatus.

This projected first year's work in related drawing is a practical one. No theories are touched on. No tools or instruments are needed. All the boy needs for blueprint reading is a pencil. And use of cross-section paper in sketching eliminates need for all instruments except pencil, compasses, and ruler.

For the teacher all this would mark no violent change. There is plenty of material available for making up a course in elementary blueprint reading. Shop sketching has been done for years. Combination of the two can be accomplished easily enough.

If the student is able to remain in school the full three or four years, he then has plenty of time to go into the creative aspects of mechanical drawing. Thus the emphasis is distributed as it should be.

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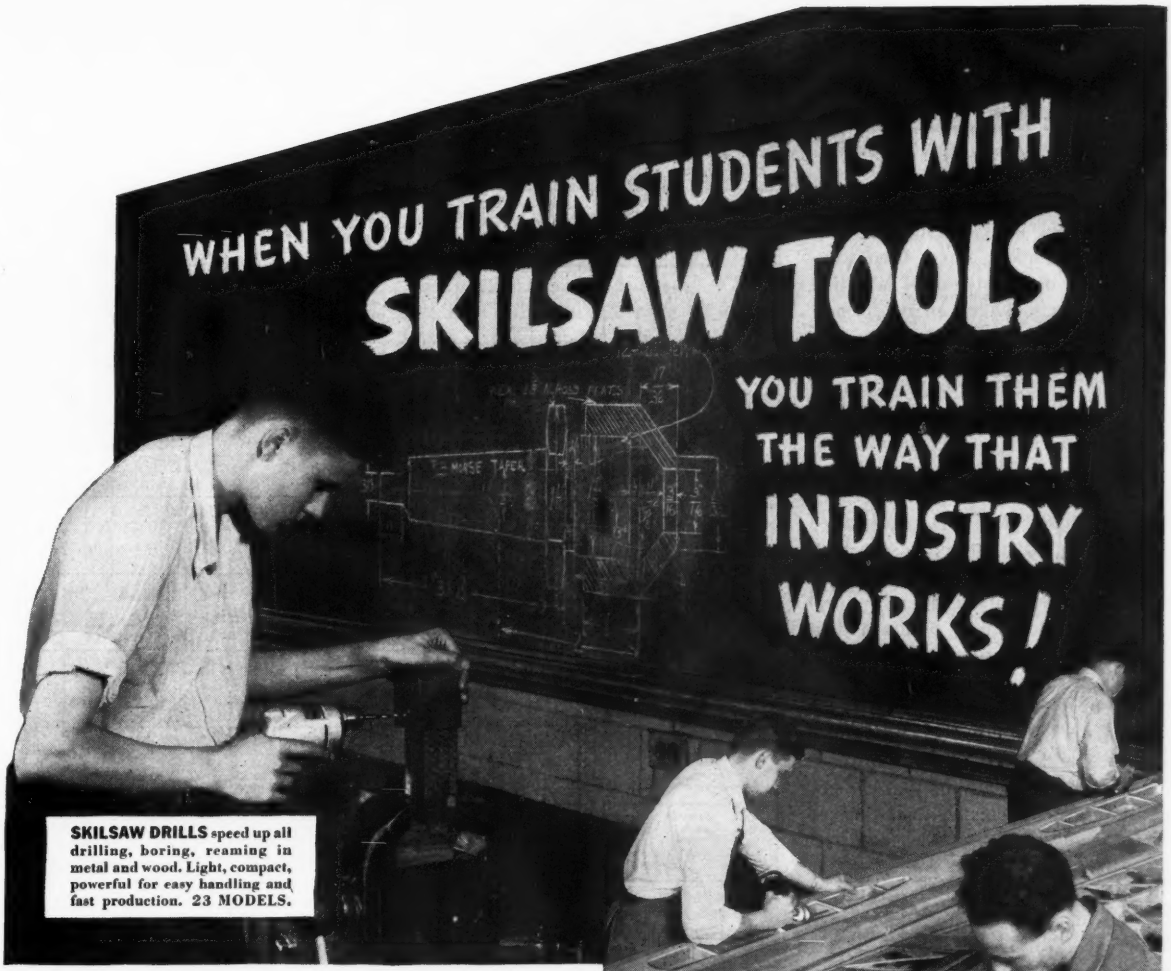

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Tool Checking Sheet

A tool-checking system used successfully for years at Tappan Intermediate School, Detroit, where Earl O. Phillips teaches.

BY *Earl O. Phillips*

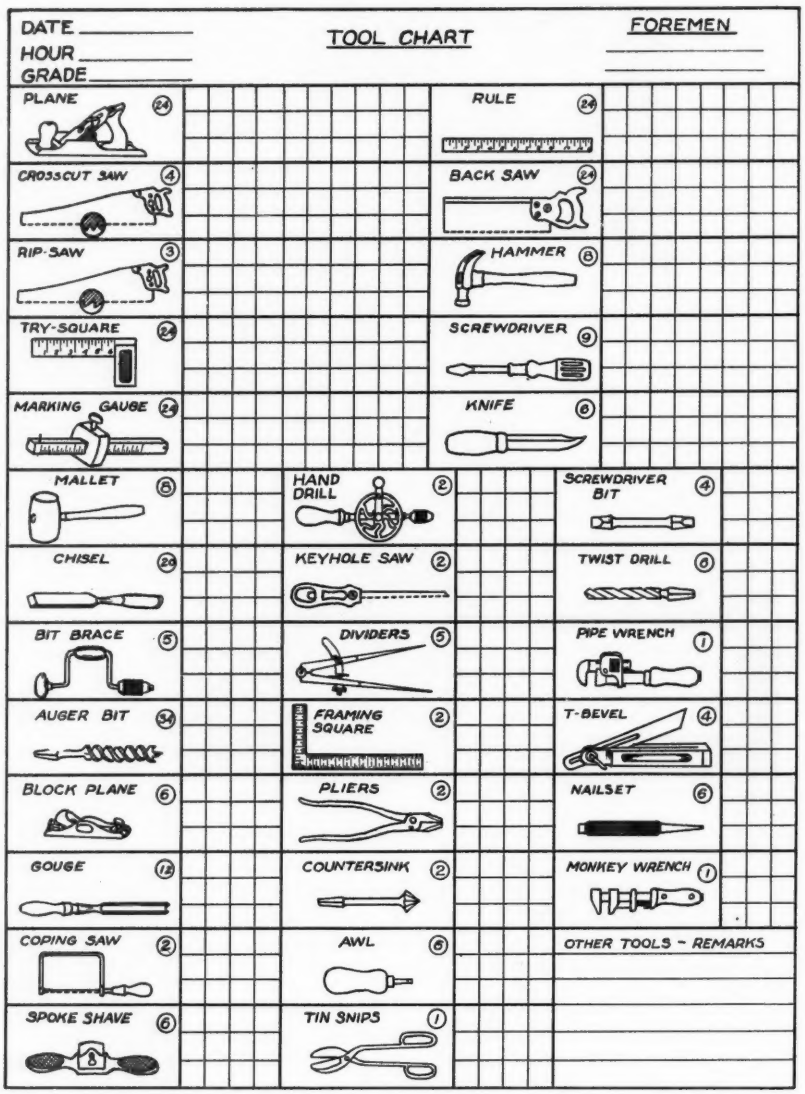
DURING the past few years, teachers of shopwork in the elementary and junior high schools have been confronted with the problem of teaching large classes with wide ranges of individual differences and aptitudes. The problems of handling such classes are not due so much to the lack of subject material and its presentation or to the organization of student personnel, as to the lack of organization in the handling, care, and distribution of the shop tools.

Many methods and devices are used to care for the distribution and checking of tools. In many cases, tools are conveniently placed on racks and panels about the shop to be used by the student as his need for a particular tool arises. With such a method, no student except the foreman is held directly responsible for any tool.

On the sounding of the clean-up bell, the tools are gathered and placed back upon the racks and panels, and checked only by seeing that every rack and panel is filled. By such a system, many tools are returned out of adjustment, dull, or with parts missing. This inevitably creates confusion in the following class by students picking over the tools to get the better ones. Also, without having to call for tools by name, students do not learn their identity.

One must admit that such a system eliminates the problem of a tool-crib bottleneck at the beginning and end of every period. It speeds distribution and collection of tools, but defeats one of the primary aims of general woodworking, i.e., the identification, care, use, and appreciation of the woodworkers' tools.

Many shop instructors resort to the use of the brass-check system, one of the commoner systems being the placing of a check with the student's identification number on it below or above the tool's location in the crib. At the end of the class period as the tools are collected, the checks are replaced upon a rack in their proper sequence. One drawback of such a system is that it slows up distribution and collection of tools, thus creating a tool-crib bottleneck. Also, the tendency to mix the checks upon the filing rack and the frequent loss of these checks are problems to contend with.



A more efficient system than either of these is to check tools from the crib by the use of a tool-check sheet as illustrated. Here the picture and name of the most frequently used tools are listed in the order of their demand. After each picture appears a sufficient number of squares to register the students' shop numbers for each tool taken out. Upon the return of the tools, the students' numbers are crossed out. Just above each picture appears, within a small circle, the tool's inventory number.

At the beginning of each new class period, the tool-crib foremen are given a new sheet. At the end of the period the sheet is returned to the instructor for filing.

Through such a system, the responsibility for the care and return of the tool is placed directly upon the student. By having to ask for a tool by its proper name, a student soon learns to identify the shop tools. This system of checking is economical, and it simplifies and speeds up the distribution and collection of tools.

With a little patience and skill, any instructor can cut a similar stencil to be used on the school mimeographing machine or prepare a drawing for the gelatine-type duplicator.

instructional resources

Inquiries concerning materials described in these columns may be addressed to SCHOOL SHOP, Box 100, Ann Arbor, Mich., and will be passed on to the proper firm or person.

Books . . .

Grinder Job Training Units. Staff of Dunwoody Institute. Chicago: American Technical Society, 1942. Pp. 111. $1.25.

A series of job and instruction sheets on grinding developed by the Metal Trades Department of the William Hood Dunwoody Institute of Minneapolis. Each job lists tools and materials and contains general instructions, operating steps, sketches, suggestions, questions, and references on the subject of the lesson. The appendix contains sections on blueprint reading, shop knowledge items, suggested demonstrations by instructor, and references.

This volume is one of a series on machine shop work prepared by the Dunwoody staff and published by the American Technical Society.

Suggested Unit Course in Bench Work. Albany: New York State Department of Education, 1942. Pp. 88. $0.75 (single copies).

This suggested unit course in bench work for beginners in machine shop practice was prepared by the Bureau of Industrial and Technical Education of the New York State Department of Education as one of its series for vocational education for national defense industries. The subject matter is arranged in parallel units, one on trade theory and the accompanying one on fundamental processes using the theories discussed.

Subjects covered are measuring tools, bench tools, iron and steel stock, cutting, layout, punching, filing, tapping, and threading.

Publications in this series should be ordered from the Greenwood Co., 49 Sheridan Ave., Albany, N.Y.

The Care and Operation of a Lathe. Chicago: Sheldon Machine Co., Inc., 1942. Pp. 106. $0.50 (see below).

This concise manual covers the operation and care of the lathe from its original uncrating, oiling, and breaking in—to the technics of thread cutting and other lathe work. Illustrates and explains the parts of the modern back-geared screw-cutting lathe and their functions, and the performance of basic lathe operations. While not a "shop kink" book nor a handbook of tables, the manual has the essential do's and don'ts, is well illustrated, and is exceptionally complete in its tool grinding charts. Single copies are fifty cents each, with discounts for schools or other quantity buyers.

Aircraft Inspection. Wissman. New York: McGraw-Hill Book Company, Inc., 1942. Pp. vii + 268. $2.50.

A general overview of the field is presented, covering use of blueprints, standards of workmanship for the various airplane parts, major and minor assembly operations, and the fundamentals of organization of the various systems, such as fuel, oxygen, etc., within the plane. Chapters and paragraphs are numbered for ready reference. Checking lists, illustrations, and index are included.

Lessons in Practical Arc Welding. Chaffee. Troy, Ohio: Hobart Trade School, Inc., 1942. Pp. 191. $0.75.

Really Part II of *Practical Arc Welding.* An operator's training course of 41 exercises on arc welding, together with quiz questions and the American Welding Society's "Tentative Standard Methods for Mechanical Testing of Welds." Numerous figures and illustrations; an alphabetical index.

Guide to Metal Cutting Efficiency. Indianapolis: E. C. Atkins & Company, 1942. Pp. 30. No charge.

Specifications and ordering information, tables, and charts to assist in finding the "right blade for the right job," neatly and concisely gathered together in a pocket-sized manual.

How to Read Electrical Blueprints. Heine and Dunlap. Chicago: American Technical Society, 1942. Pp. vii + 311. $3.00.

The book is divided into eight sections, each covering a different electrical field and each having a "dictionary of symbols" used in it. Diagrams and pictures are provided, together with an explanation of fundamental operations behind the blueprint. A questions-and-answers division in each chapter offers an interesting means of giving additional information, while quiz questions are included for testing purposes. Nine blueprints for demonstration purposes in teaching are enclosed. Index.

Gilbert M. Heine is supervisor of work on electrical controller diagrams, Cutler-Hammer, Inc., and associate member of the American Institute of Electrical Engineers. Carl H. Dunlap is head of the electrical engineering department of the American School, Chicago, and also a member of the A.I.E.E.

Auger Bits—How to Sharpen and Care for Them. Chester, Conn.: Russell Jennings Manufacturing Co., 1942. Pp. 6. No charge.

Care of auger bits, as well as descriptions of types and sizes, is presented in this small well-illustrated pamphlet.

Films . . .

Industrial Arts . . . for Modern Living. Chicago: Board of Education, 1942. 16 mm.; sound and color; 1 reel.

An all-color film describing the industrial arts program of the Chicago schools from elementary grades through high school. Primarily for parent groups, but of interest to teachers and administrators. Available for transportation costs.

The Cover . . .

Student in the machine shop of Brooklyn, N. Y., Technical High School making a compression test on a testing machine. (Photo courtesy U. S. Office of Education.)

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Vocational Schools and War Production

BY *George H. Parkes*

This article deals with a subject which should be receiving very serious consideration by city directors. In all-out war effort, schools are included as well as everyone else. Nevertheless, war production raises peculiar issues in the school's relationship to industry. Mr. Parkes, who is Director of Industrial Education for Williamsport, Penna., writes realistically of the school's duty in this respect.

A student at the Williamsport Technical Institute inspecting a close-tolerance production job.

THE production of war material as a by-product of trainee instruction is to become the standard practice of all first-line vocational schools. Indeed, most of the schools which have close associations with industry are at it now, and a word or two as one director to another ought to be timely.

One large vocational school which has a reputation for its close industrial contacts has found itself gradually drifting into war production in one form or another for several years. This was the inevitable result of the school's policy of making industry's problems its problems. For example, in one case, a large and unusual defense part could not be made in the plant because of the lack of a certain machine, but the school had a suitable machine and could and did produce the job. Again, the plant equipment breaks down or is "bottlenecked." As plants in a given area trade machines and jobs in emergencies, so must the school give and take in the production problems of the area. All good vocational schools engage in such production trades with their industrial clients as a matter of course.

Why not, as the production problems of war industries become critical, expect the schools to pick up more and more responsibility? The point here is that local directors should move speedily toward such local war production cooperation, first, as a patriotic duty, and, second, as a part of their normal relations with their harassed industrial friends.

Another reason for close local cooperation in war production by vocational schools has to do with selfpreservation. If present trends continue, vocational schools may one day find it impossible to purchase equipment and materials for purposeful training. True, there will be sufficient metals available for the exercise jobs which sometimes masquerade as productive work, but the bar stock to feed a hungry turret lathe, working toward production speeds and finishes, is a totally different matter. First-rate short-term war production training calls for a staggering amount of materials which cannot be spared from actual production. Vocational schools must adjust themselves to this changing material situation, or they may face the unpleasant reality of going out of business. The industrial tie-up is the answer. Of course, as long as industry wants trained workers, vocational schools will be on the job.

In the war years ahead, we must think in terms of contracts, prime or sub. The vocational director who is thinking clearly will gear his organization into the mad scramble called subcontracting, even though he does not actually enter the production market for profit. He may be inclined to think of his organization as amateurish and of an inferior industrial skill in production methods, but he may also be pleasantly surprised to find that his faculty can plan production and get out production at a rate he need not apologize for. In one school, for example, the staff planned and produced 1600 parts of 40 separate orders for a local aviation engine plant in one month and did this according to the high inspection standards of that industry. In this case the production happened to be chiefly in the tool and fixture field. At another point in the same school there was produced what must be called a satisfactory number of parts where the production tolerance was two tenths and the finish was two micro-inches.

It is important that schools banish all feeling of inferiority in production matters and deal with the industry as contracting parties. It is suggested that the school should accept job orders from the plant, with such suggestions and advice as may be available, but wherever possible, the school should plan its production methods, fixtures, inspection, and other details as a part of the instructional procedure. It should, wherever possible, accept only work which can be completed in the school and then stand squarely on its feet as a producer to prescribed tolerances and finish. The attitude of "pretty good for a school" is to be avoided.

There is some reason to believe that the time limit for completing a school subcontract should be very flexible. In general, production work can be brought to any degree of accuracy and finish even in schools, if time is unimportant, and to any reasonable rate of production, if accuracy and finish are unimportant. Since all parts for war use must pass rigid inspection, it is sug-

gested that time promises be given sparingly.

As this swing toward war production takes place, we must be prepared to answer questions about the use of public funds and public facilities for producing parts which can be sold for profit by a prime contractor. Notwithstanding the fact that the true objective is to train workers and to produce for the war effort, attention must be given to the answering of such questions.

In the writer's experience with this problem, there is ample evidence that no one will get rich on school subcontracts. If a conscientious job of training is going forward, the scrap will eat up any profit which exists. Also, if the productive work is to be on a truly commercial basis, the industry must provide tools, gauges, cams, die heads, and special attachments. For war material, improvised tools are not satisfactory, and the school should insist on good tooling being provided by the industry. It is assumed of course that the industry will provide the stock.

The present fabric of labor laws is essentially a peacetime development, designed for the protection of industrial workers and the public. Emergency war production by schools will inevitably conflict with these laws for some time to come, but an intelligent and cooperative approach will open at least a partial path to an all-out school production program. Most local advisory boards would agree that productive work done by students under instruction is not harmful to labor standards unless the students collectively produce more than the instructor would if he were in active production.

When schools do enough production work to constitute a substantial production unit, it is suggested that the prime contractor assume the role of employer and pay the learners a minimum legal rate for their services while working on production in the school. In one large vocational machine shop, an entire production line has been established in the school shop. The instructors are employed by the school, but the plant provides special tooling material and pays the going rate for the industry to the learners.

It is generally agreed that employee and employer relationships do not exist where the article produced is used in the school or disposed of without profit to other schools and public agencies. Along this line, a very important war contribution has been made by schools which produce tools and parts for ordnance inspection. As we awaken to a more general appreciation of the gravity of the national situation, we may expect certain rulings or laws which will remove the present obstacles to war production by schools.

Manpower Bottleneck

Labor shortages in 138 occupations essential to the war production effort have been listed by the War Manpower Commission. The situation is most serious in the vital metalworking and industrial machinery trades, and in occupations essential to shipbuilding, aircraft, tool, and ordnance manufacture. The following figures, showing the ratio of workers needed to every worker available in the most critical occupations, are a challenge to school shops training workers for war industries:

Ship and boatbuilding assembler	94 to 1
Plate hanger (shipbuilding)	62 to 1
Skin man (aircraft)	48 to 1
Tool maker	31 to 1
Cranerigger	22 to 1
Boring-mill operator	16 to 1
Internal-grinder operator	15 to 1
Tool designer	15 to 1
Die maker	14 to 1
Skeleton assembler (aircraft)	14 to 1
Metal chipper (shipbuilding)	11 to 1
Finish boat painter	10 to 1

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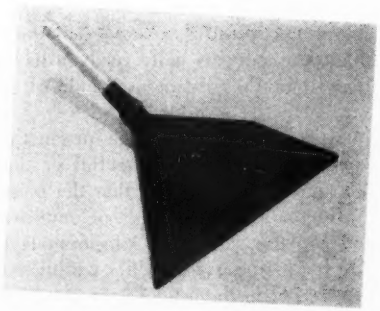
Dust Pan..

A simple useful project to give students experience at forming and shaping metal on general sheetmetal shop equipment. Otto A. Steinike is head of the drawing department of Beaver Dam, Wis., High School.



BY ***Otto A. Steinike***

HERE is a project that is familiar to all sheetmetal shop teachers, but the design and assembly are different from most dust pans. This project is used in our eighth grade classes to give students an opportunity to form and shape metal on general sheetmetal shop equipment. The project is made of black sheet iron, a good substitute for dust pan projects usually made by soldering and galvanized metal, which, at present, are vital to war needs. The project acquaints the student with brake forming methods, riveting, pattern layout, stake forming, bar folding, and drilling.

In developing the body, *A*, the brake forming can be best made on a shoe brake. If that is not available, a beakhorn stake may be substituted, but this will have a tendency to stretch the metal and a perfect top joint fit may not result.

The handle might be difficult to develop, but a statement on the forming of part *M* will clarify this step. A 3″ section of an automobile connecting rod will give the best results. The connecting rod is placed in back of part *M* and a 5/16″ rod is placed on the part *M* directly in line with the connecting rod piece as shown in Fig. 1. Care should be taken to have the rod rest on the vertical center line scribed on the handle. When this combination of parts is assembled in the vise, force together and form part *M*, and while in the vise, bend back grip *K* as shown in Fig. 1.

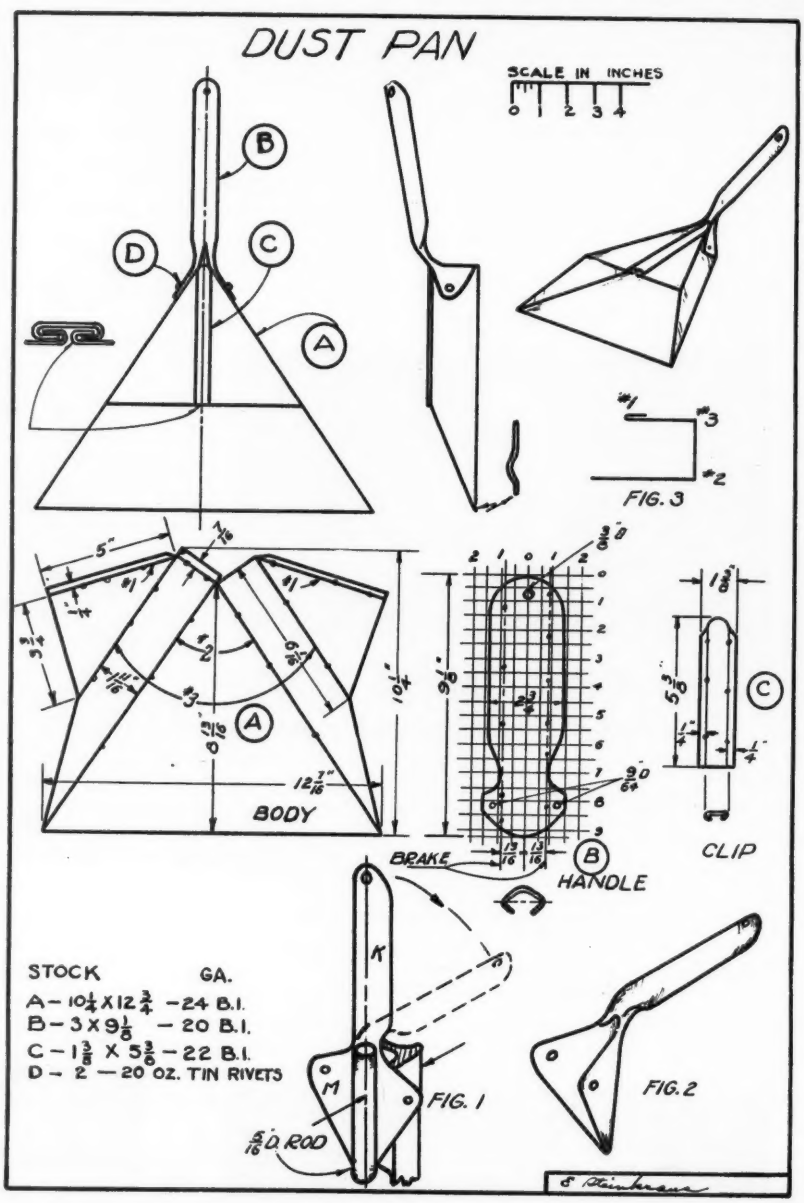
The handle can then be removed and finish forming *M* on a stake as in Fig. 2. Other forming arrangements might be tried but this arrangement is quick and the results are satisfactory.

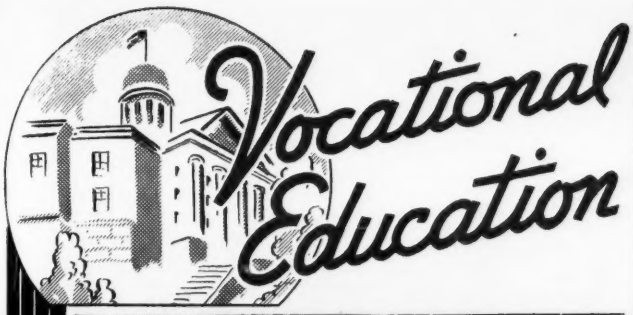
Dust Pan Body—24-G—B.I.: 1. Layout around patt. 2. Locate and scribe brake lines No. 1, No. 2, No. 3. 3. Cut out and remove burrs. 4. Bend-fold No. 1 on bar folder. 5. Bend-fold No. 2 on shoe brake. 6. Bend-fold No. 3 on shoe brake. 7. Bend-fold 7/16″ lap to shape of pan. 8. Run front edge through bead roll lightly.

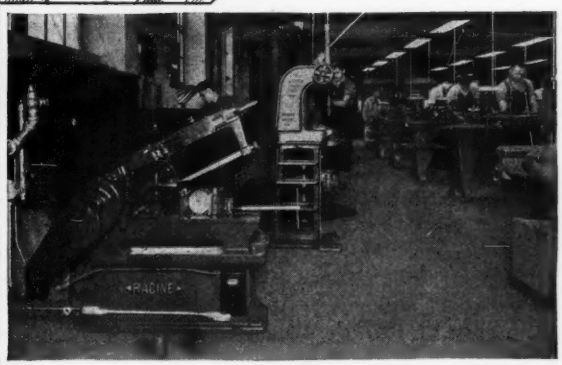
Fold Clip—22-G—B.I.: 1. Layout around patt. 2. Bend on bar folder. 3. Fit and cut to proper length.

Handle—20-G—B.I.: 1. Layout around patt. 2. Locate and draw center line. 3. Scribe two brake lines 13/16″ from center line. 4. Cut out blank. 5. Punch or drill hook hole 3/8″ diam. 6. Drill for rivet holes 9/64″ diam. 7. Bend grip on brake lines. 8. Form *K* end on candlestick stake. 9. Form *M* with forming tools by force clamping together in the vise—as shown in Fig. 1. 10. Shape *M* with beakhorn stake to fit pan as shown in Fig. 2. 11. Remove burrs.

Assemble: 1. Slip clip *C* on pan joint (use mallet to make tight fit). 2. Locate hole on pan with handle as a gauge and drill for rivets 9/64″ diam. 3. Rivet on handle. 4. Paint.







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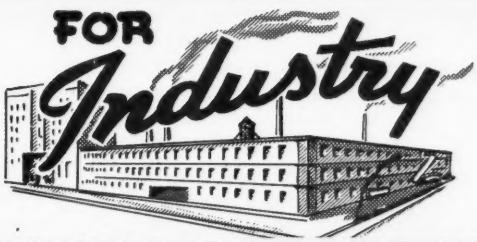

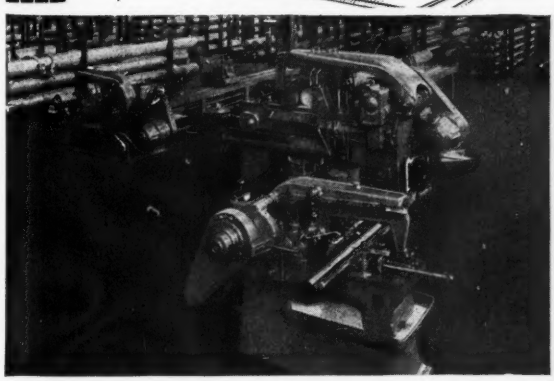

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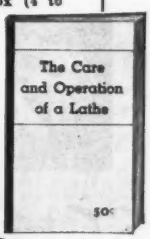

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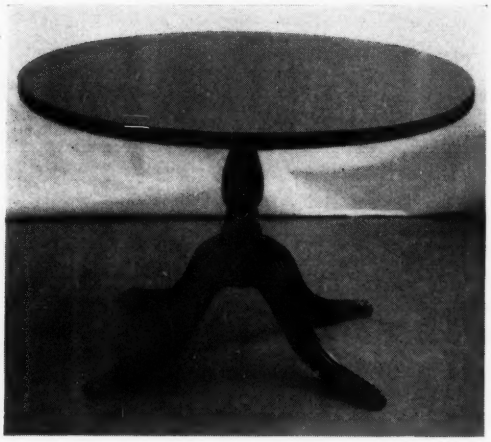
Coffee Table

BY *J. E. Tolman*

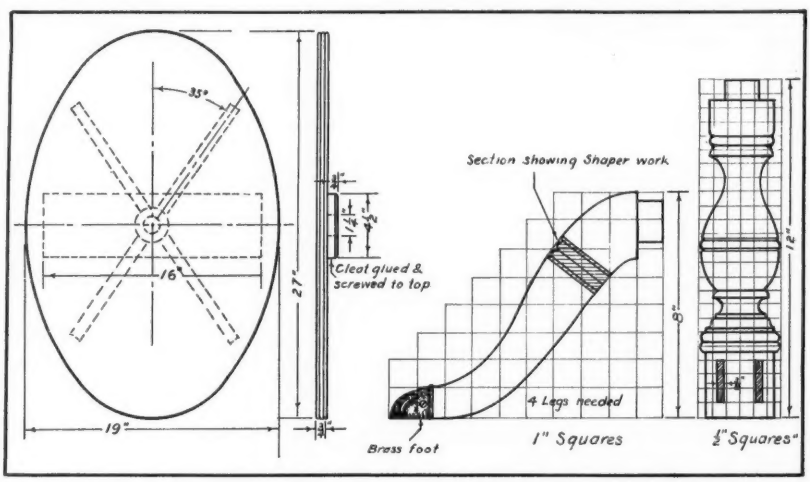
This well-designed project is not too involved for the average student and offers the opportunity of teaching several hand-tool and machine-tool processes. J. E. Tolman is head of the woodshop in the Chaffey Union High School, Ontario, California.

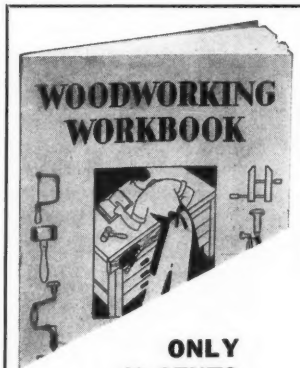


THIS project with its atmosphere of the Colonial days fits in with the furniture in the majority of homes. This adaptability and its simple construction features make it a very popular project with students. Although it is simple in construction, a large number of tool processes are involved as well as diversity in machine work. The student gets experience in the use of the band saw, shaper, and lathe.

The drawing shows brass feet which add much to the finished job. They are not an absolute necessity for a well-shaped foot of wood is quite satisfactory. Cast brass feet are often too expensive for many shop students.

Mahogany or walnut are most appropriate for this project, although other fine cabinet woods may be used. The color of the finished project should blend with the setting in the home.





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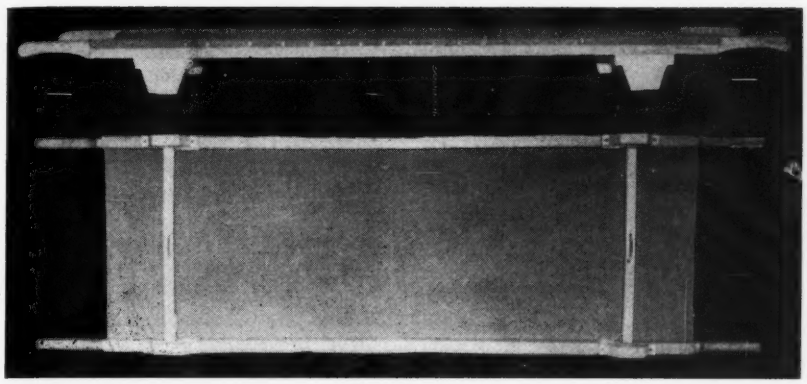


Side and bottom views of stretchers.

First-Aid Stretchers

BY *Richard De Forest*

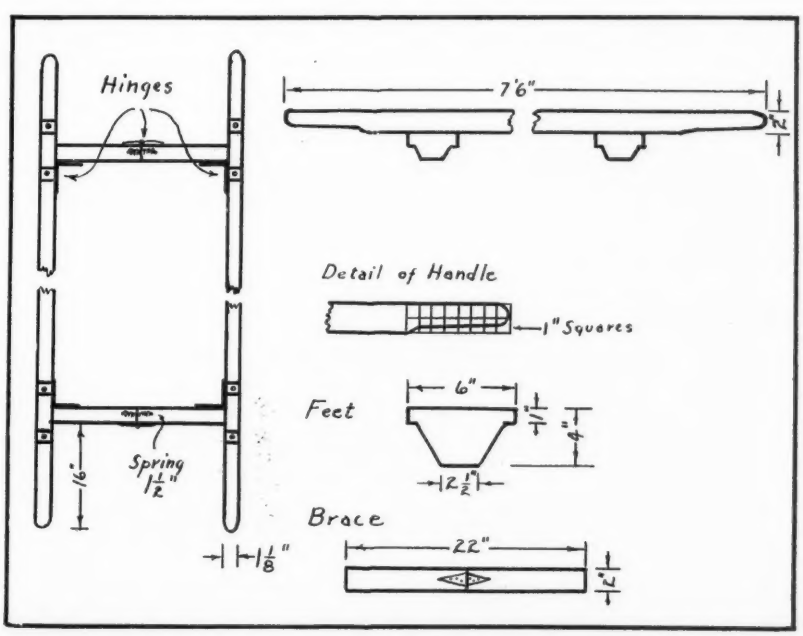
This timely project can be set up as a production job or done on an individual basis, depending on the local situation. Some schools are working in conjunction with local Civilian Defense Officials in making stretchers for possible emergency use. Richard De Forest teaches in Eastchester High School, Tuckahoe, New York.

AT this time when nearly all the schools of the country are constructing air-raid shelters and enlarging their first-aid facilities, the school shop continues to play an important part in the life of the school and the community. One of the many useful projects for this period is the constructing of stretchers for use in the school first-aid stations. Following is a description of one of the stretchers. The wood used was straight grain fir, although any strong wood will suffice.

BILL OF MATERIALS

2 pcs. 1⅛″ x 2″ x 7′6″ (Rails) Fir
4 pcs. 1⅛″ x 4″ x 6″ (Feet) Fir
4 pcs. 1⅛″ x 2″ x 11″ (Braces) Fir
1 pc. heavy canvas 28″ wide, 6 feet long.
6 3″ strap hinges.
Use 1″ No. 8 F.H.B. screws for hinges.
Use 1½″ No. 8 R.H.B. screws for feet and springs.
2 springs 1½″ long (a screen door spring can be cut)

Note: Canvas is hemmed along edges and tacked along *side* and *top* of rails with heavy ¾″ tacks. It is then stretched across and tacked to the other rail. Care must be taken to draw the canvas very taut.



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PINE DUCK

Book Ends

BY *Amanda Hellum*
BERRY SCHOOLS
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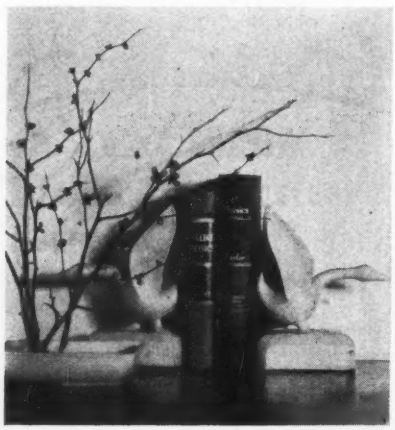


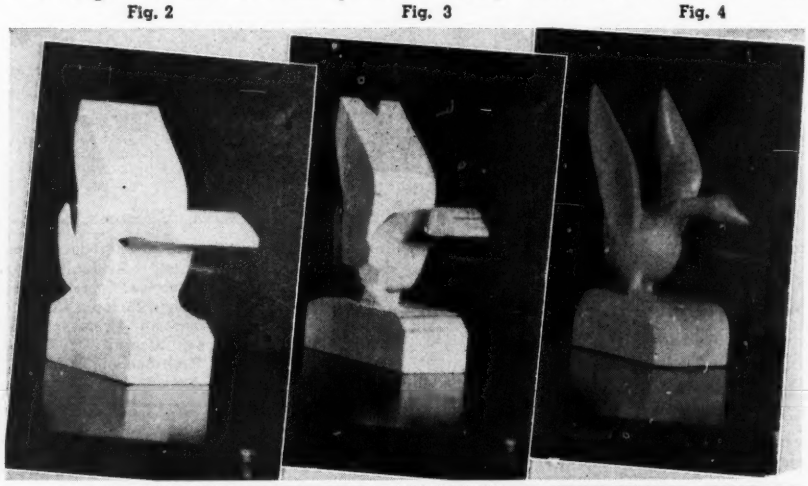
A simple project calling for manual skill and a good sense of line and artistic balance. Materials used are inexpensive, and tools required consist only of knife, sandpaper, and wax or varnish. Students at the Berry Schools help pay their way with such carvings.

A BOOK end must be heavy but at the same time have rhythm of line and good proportion. These ducks qualify in all these things. Select a piece of sugar pine because it has long brownish resin ducts in all portions of the wood which add to the beauty of the finished object.

Next, draw the side view of duck from pattern, Fig. 1. For these book ends, use 3″ thick pine. Draw with pencil around the pattern on the wood, making sure the grain of the wood runs up and down to give strength to the wings of the duck. Cut around the pattern you have drawn on the wood with a band or coping saw. The duck should measure about 7″ from beak to tail.

We are now ready to start work on the block. Draw a pencil line down the middle of the block that will help keep good proportion. Start cutting away, with the large blade of your knife, the excess wood around the head and neck, keeping them in a rough "blockey" state. Use a V-cut to take

Fig. 2 Fig. 3 Fig. 4



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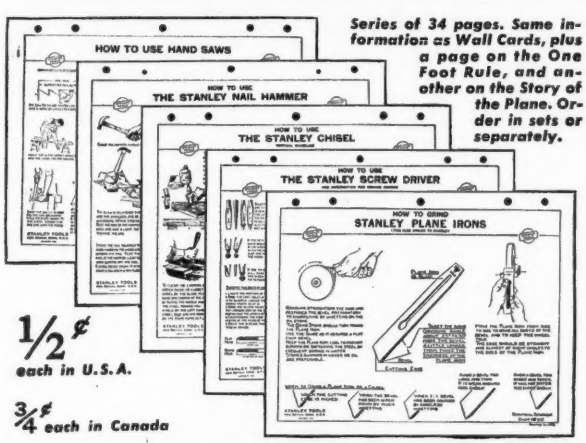

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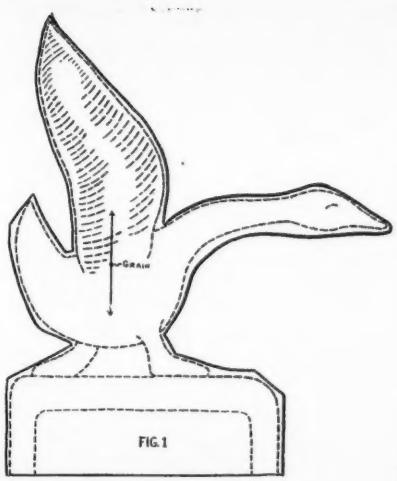

FIG. 1

the wood from between the wings, (Fig. 3). Round off the body, shape the tail to a point in the back, and hollow the outside of the wings, (Fig. 4).

Study Fig. 4 closely to get the design of the feet. Study the shape of your duck—take off a little here and there to get it in good proportion. Do not get his neck too thick for his head. His body will round from the base of the wings down between his feet. Round the edges of the wings. Give him a tapering bill. The design for the base must be simple; flatten the edges and corners and you have all the design needed. These last steps should be done with the small knife blade.

Begin sanding with No. 4/0 sandpaper, then with No. 6/0 sandpaper—the more sanding done the nicer your finish on the ducks will be. Clean off all dust from the sanding and apply a coat of Johnson's floor wax, and let dry.

Polish and apply another coat. Repeat about four times. Gouge out a hole 2″ x 1″ and about 1″ deep and pour hot lead into it. A piece of green felt glued to the bottom will complete the first duck. But you know it takes two ducks to make a pair of book ends.

Strictly Personal...

ABOUT YOUR FELLOW TEACHERS

THE DEATH was announced this June of Prof. Charles A. Bennett, teacher at Bradley Polytechnic Institute, founder and editor of *Industrial Education*, and founder and chairman of the board of the Manual Arts Press, Peoria, Ill., and for many years a leading figure in industrial education . . . New head of the Kent State University industrial education department, Kent, Ohio, is Dewey Barich, who comes to his new post from the Michigan State Board of Control for Vocational Education . . . New educational director of the air school of Hartung Aircraft Corporation, Detroit, Mich., is L. C. BAGBY, formerly of Linsly Institute of Technology, Wheeling, W. Va. . . . RAY LABOUNTY, formerly of Kalamazoo, Mich., now teaches shop at Plymouth, Mich. . . . EDWARD N. JONES, dean of the College of Arts and Sciences, Baylor University, Waco, Texas, has succeeded JAMES O. LOFTIN as president of Texas College of Arts and Industries, Kingsville . . . C. O. BANTA, vocational education director at Ottawa, Kansas, is now dean of vocational education, Trinidad, Colo., State Junior College . . . Newly organized Ross County, Ohio, Industrial Arts Association has elected ARTHUR HINTON, of Centralia, its first president. WILLIS LIGHT, Kingston, is vice-president; WILLIAM HACKNEY, Bainbridge, secretary; and CARL TOPPING, Clarksburg, treasurer . . . FRANK MCCAIN is now principal of the Banquo, Ind., high school . . . R. G. BRADSHAW teaches woodworking at Rockfield High School, Delphi, Ind. . . . HARRY A. BURNHAM, former director of vocational education in the Flint, Mich., public schools, is now with the personnel department of A-C Spark Plug Division of General Motors, of that city.

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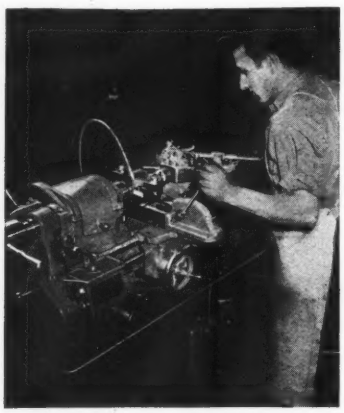
. . . news from INDUSTRY

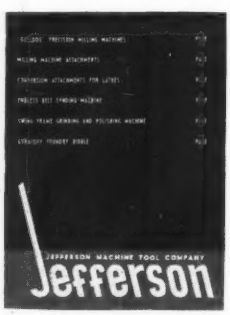
For items listed in this column, readers may address the firm named or write to News from Industry Dept., SCHOOL SHOP, Box 100, Ann Arbor, Michigan.



New South Bend Small Turret Lathe

Rapid production to close tolerances on chucking operations or bar work is possible on a new bench-model turret lathe just announced by the South Bend Lathe Works. The lathe has a 10" swing over bed and saddle wings, 1⅜" hole through headstock spindle, and 1" collet capacity.

The handlever operated bed turret indexes automatically and has an adjustable stop for each of the six turret faces. The lathe is equipped with both a compound rest cross slide and a handlever cross slide, which are interchangeable. A quick-change gear box supplies 48 longitudinal power feeds for the universal carriage, 48 power cross feeds for the compound rest cross slide, and 48 thread-cutting feeds, 4 to 224 per inch. For further information, write South Bend Lathe Works, Dept. S5, South Bend, Ind., or to SCHOOL SHOP.



New Catalog Describes Jefferson Machine Tools

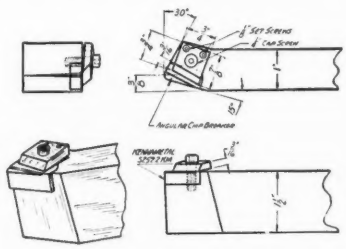
Descriptions of the entire line of the Jefferson Machine Tool Co. are presented in the company's latest catalog. The catalog lists, with illustrations and specifications, all of the Jefferson products, including "Bulldog" milling machines, milling machine attachments, conversion attachments for engine lathes, endless belt sanding machines, swing frame grinders and gyratory foundry riddles.

Of particular interest to shop teachers will be the milling machine and the conversion attachments for making an engine lathe into a turret lathe. Copies of the booklet may be had without charge from the Jefferson Machine Tool Co., Fourth and Cutter Sts., Cincinnati, Ohio, or from SCHOOL SHOP.

Clamped-On Carbide Tool Tips

School shops making up their own carbide cutting tools can greatly simplify the job and at the same time be assured of strain-free tools by using a clamped-on tool. A simple design which has been found satisfactory has been worked out by McKenna Metals Co., Latrobe, Pa., for use with Kennametal and other carbide tips. A tool shank is milled out, care being taken to get as flat a surface under the tip as possible, and a single clamp attached.

Any danger of brazing strain is, of course, eliminated, and grinding is simplified since only the carbide tip is in contact with the grinding wheel; no steel



loads up and glazes the special silicon carbide grit.

As the tip is reground, it is moved forward and out under the clamp, shims being placed behind it. When the tip becomes too small for service in this tool, it can frequently be brazed into a smaller shank for lighter turning operations or boring.

WHAT'S DOING IN THE FIELD

news

OF INDUSTRIAL EDUCATION

AVIATION is demanding ever increasing space among items of interest to industrial education teachers. Latest proposal, by the Chicago Association of Commerce, is that Chicago's high schools teach preparatory aviation courses. Under the plan advocated by the association, the third and fourth year parts of the physics and mathematics curriculums would be directed specifically toward aviation uses. Preaviation aerodynamics, meteorology, navigation, and communications would be encouraged electives.

Dr. William H. Johnson, Chicago superintendent of schools, states that if the plan is adopted, it will be installed in all high schools. This training would, proponents of the plan say, save valuable Army and Navy training time. Both Army and Navy are back of the plan, and extra equipment will be provided by private aviation interests.

UNDER terms of the WPB Priorities Regulation No. 10, all purchase orders of schools and educational institutions must bear the following notations:

Purchaser's symbol—DP
Allocation symbol—17.20

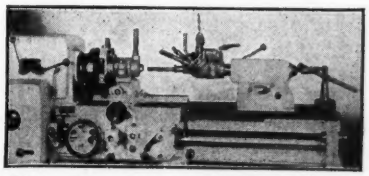
Suppliers with whom unfilled orders have been placed should also be given the above information.

THE ANNUAL Pennsylvania Vocational Association Conference was held at Eagles Mere, Pa., in June, at which time discussions were held on means of furthering the contribution of industrial education to the war effort. Among the principal speakers were Jack Barbash and Dr. Harry Jager of the U. S. Office of Education; Dr. Francis B. Haas, State Superintendent of Public Instruction; and John McCarthy, New Jersey State Director of Defense Training.

PURDUE University's student machine shops at Lafayette, Ind., have recently been converted into a war production factory under the terms of a Westinghouse subcontract, according to R. A. McCarty, vice-president in charge of the company's subcontracting program.

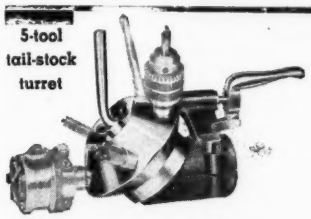
More than 275 engineering students enrolled in the shop course are working part time on the contract, equalling a total production equivalent to a 75-man machine shop working full time. Special stock for some parts is furnished by Westinghouse, and for other materials, the WPB has issued a priority rating.

ANY ENGINE LATHE CAN BE CONVERTED INTO *A Turret Lathe* IN 15 SECONDS



Train TURRET LATHE Operators on your ENGINE LATHE

Photo shows turrets applied to 16" lathe



5-tool tail-stock turret

● This new modern TOOL-POST TURRET (below, right), made in 2 sizes, designed to increase production on engine lathes. Easily mounted on cross slide or compound rest. Has capacity of 4 standard tool holders which are easily inserted and rigidly held. *10 days delivery.*

pat. pending

4-tool tool-post turret

● Then there's the completely modernized 5-tool TAIL-STOCK TURRET (above), made in 4 sizes to fit small bench lathes and lathes up to 20" swing. Also the adjustable PULL-FEED LEVER. All tools are precision made attachments which will convert any engine lathe into a production turret lathe. *10 days delivery.*

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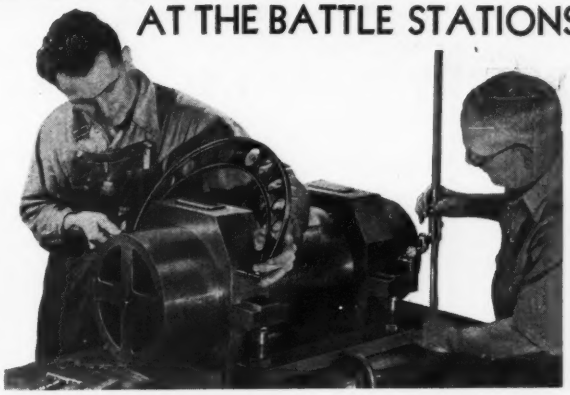

This picture shows Starrett Tool users at the Goss Printing Press Co. working on heavy caliber anti-aircraft guns for the U. S. Navy—a job that has already won the coveted Navy "E".

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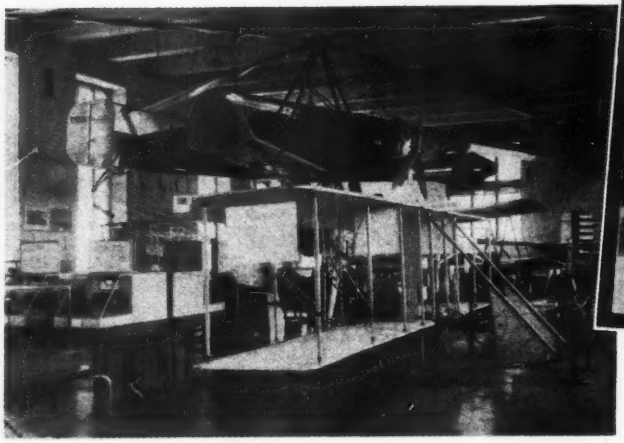


BY *Chris H. Groneman*

FEW instructional devices have gained in popularity during the last few years as have those now commonly classed as *visual aids.* Although the basic lecture method of teaching will continue to play an important role in education, this method is being extensively augmented by the wise use of visual aids—not only screen projections, as the most common types, but the many other kinds of visual aids as well.

Particularly valuable are visual aids in teaching industrial arts. Students are prone to misinterpret, or to lack interest in, industrial processes and methods, which are on the whole entirely new to them. They have little experience or background on which to base their conceptions of industry. Pictured methods increase the accuracy and scope of the impressions created in the minds of the students.

In addition to the negative values of visual aids in speeding up teaching and in removing the obstacles of verbalism, these teaching methods have the positive value of inducing active interest on the part of the students. Disciplinary problems are minimized, so that more of the students' time is devoted to learning. Authorities in the field have definite proof, too, from their observations, that students learn more from *seeing,* that they remember what they see *longer,* and that they *believe* what they can see with their own eyes.

Most common visual aids are those for screen projection. But there are other types of visual aids, most of which you use in your teaching: industrial visits and tours; projects, models, and exhibits; pictures, maps, charts, graphs.

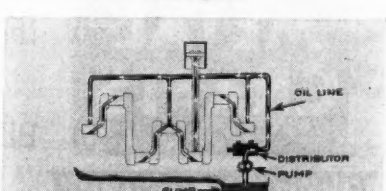
Value of trips to local industries depends largely on the variety of industries to be found in the teacher's city; every town, however, has some industry close at hand that is worth examination by the students. Such visits should be to study production methods, to gain consumer information, and to serve as a vocational guidance device. These visits are functional and concrete because a real situation is *observed,* not described; firsthand information is provided, and a true presentation of industrial skills can be made to the student. These trips have value, too, measurably as the teacher prepares for them, determining the skills and processes to be observed, etc.

Projects, models, and exhibits are a form of unprojected material which can be displayed within the industrial arts department, school exhibit cases, or at special school events. Industrial arts teachers might well devote a certain space in their shops for the permanent showing of this type of visual aid. Many industries furnish displays and exhibits of their products, showing both how they are made and how they are used, as in the case of tools. The teacher may use his ingenuity, too, in assembling interesting and informational exhibits of, for example, various cabinet woods and information about them. It must be noted, however, that all this type of material is useless unless properly captioned and described and discussed in detail in relation to some particular lesson.

Trips to industrial museums, too, are of importance. These should not be confused with trips to industries them-

Above, left: Section of the aviation exhibits at the Franklin Institute, Philadelphia. Hand operated aerodynamic exhibits will be noted in the cases at the lower left. Right: Many manufacturers have wall charts illustrating the manufacture and use of their products. This one shows the history, making, and use of aluminum by the Aluminum Co. of America.

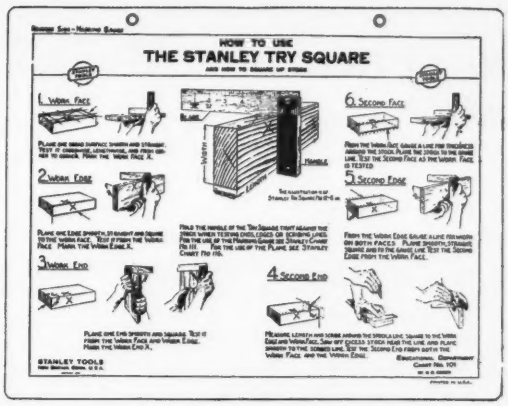
The slidefilm is a series of still pictures on a 35 mm. film strip. This view from the Jam Handy series on automechanics is complete with legend.



From the main bearings, holes are drilled through the crankshaft and crank arms leading to the crankpin bearings. The connecting rods are also drilled, so that the oil, under pressure, is forced from the crankpin bearings up the rods to the piston-pin bearings.

With the speeded-up training of workers for war industry, the use of visual aids is of particular importance to the thoughtful shop teacher. Chris H. Groneman teaches in the Industrial Education Department, Texas A & M College, College Station, Texas.

selves, since the exhibits at the museums are only partly concrete. The backgrounds or settings for the various processes displayed usually only simulate, if at all, the industrial background in which the process is found. Objects are not always displayed in true size or true relation to their surroundings, nor are they often in operation as they would be in industry. Some museums, such as the Franklin Institute in Philadelphia, do have arrangements whereby the onlooker may actually operate a machine or, by pressing buttons, perform mechanically-operated scientific demonstrations.



The correct use of tools is more easily taught when wall cards such as the Stanley Tool series are provided for continual reference by the student.

Pictures are closely related to projection material; indeed, with the opaque projector they may be projected on the screen greatly enlarged as if in the form of a lantern slide. Pictures of industrial arts significance may be found in newspapers, magazines, calendars, advertising folders, catalogs, and government pamphlets. They are "self-selling" aids if properly captioned and integrated by discussion into the lesson-material of the course.

Through the motion picture, the entire class can get as close as this to the operation being performed. Many manufacturers supply films on processes involving their products, such as this on "How to Run a Lathe" by the South Bend Lathe Works.

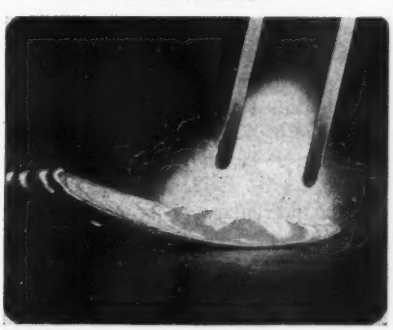
Projection material may be either still or motion pictures. Most common still pictures are lantern slides, or now the new *slidefilm*, a strip of 35 mm. film containing a series of still pictures with or without captions. The advantage of the still picture is that the teacher may discuss each one at length, which is not possible with motion pictures. Many industries furnish these films relating to their own products; while a few suppliers make instructional slidefilms specifically for sale to the schools.

Motion pictures, either silent or sound, are becoming the most popular visual aid employed. They offer action and a natural sequence of operations. They permit an entire class a close-up view of a skilled operation which in actual demonstration could be seen by only the few students near the machine.

Primary source of films are industrial firms offering them as part of their service to users of their products. These firms usually go to considerable expense to prepare complete and authoritative films showing their product in use, or showing industrial skills involving their product. And the charges frequently cover only the small transportation fee for getting the film to the user and back. Various commercial firms and government agencies, too, make films for training purposes which may be purchased outright.

For those interested in the use of visual aids as an integral part of their teaching program, visits to schools already making extensive use of them are helpful. Bibliographies published by various commercial and professional organizations usually contain lists of visual aids. And state and federal educational departments and agencies are excellent sources for information.

Motion pictures using animated cartoons can get across otherwise hard-to-understand ideas, such as this view of the inside of the arc in General Electric Company's film, "The Inside of Arc Welding."



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Washington Letter

by Ben Brodinsky

LIFE in Washington, as well as the life of any administration, can be recorded through officialdom's catch phrases. There were "the more abundant life" (1933), "pump priming" (1934), "ever normal granary" (1935) and finally came that beautiful euphemism (1940), "defense," which made military men squirm and which all Washington observers knew was a polite way of saying "war" to a nation not yet ready for war.

Almost overnight, in 1940, the term "shortages" also came into use and abuse. Even before any major war contract was let, all types of "shortages" appeared, principally labor and teacher "shortages." Most of these "shortages," however, melted away as soon as employers and school boards saw fit to raise the prevailing wages and salaries.

Now, however, the first genuine—and official—shortages have actually caught up with us. According to federal sources, these are (1) shortages of vocational and industrial arts teachers and (2) of workers in 138 skilled occupations.

● From 45 states there have poured into the U. S. Office of Education reports almost monotonous in the sameness of their story: Men shop teachers wanted—everywhere and in growing numbers. Reports summarized by Dr. Ben Frazier show that the shortages are spreading across state and regional lines. Whereas in November, 1941, only 19 states reported shortages of industrial arts and vocational teachers, in May 1942, this number had grown to 28 states.

The manpower Commission is studying this problem, including all teacher shortages generally. And while "freezing" employees is still spoken of only "off the record," Congress is nevertheless studying legislation that may be tagged with another all-popular—or unpopular—phrase: labor controls. Controls, as far as teachers are concerned, may mean nothing more than Congressional voicing of what many industrial arts and vocational teachers are already convinced: That each teacher must stand at his post until sent for or until he is certain that his services elsewhere will be of more value to the country.

● When 11,000 major war plants call for certain skilled workers and they cannot get them, you know we are face to face with a real labor shortage. That is how the list of 138 critical occupations came to light. The list was released by Manpower Chairman McNutt on the basis of hiring schedules of war industries. Mr. McNutt said that for every ship and boat-building assembler available through the U. S. Employment Service, 94 were needed. Ratio of demand to supply in other occupations stacks up as follows: plate hanger (shipbuilding), 62 to 1; skin man (aircraft), 48 to 1; boring mill operator, 16 to 1. All of the 138 shortage occupations are in the metalworking and industrial machinery trades and in occupations essential to boatbuilding, aircraft, and tool manufacture.

● What used to be known as "defense training" is now carrying on with a new sum of money and a new name. The sum is $94,000,000, appropriated by Congress to the U. S. Office of Education for running the program, and the new name is Vocational Education for War Production Workers (VEWPW).

Two features will characterize the VEWPW program this year, Washington officials believe:

1. Training centers will work more closely than ever with industry. "Earmarking"—the device of designating trainees for specific jobs in industry as they enter the training period—will spread.

2. Women, Negroes, Spanish Americans, foreign born, and physically handicapped persons will enter training in large numbers.

Already one out of every five persons now being trained in public schools for war jobs is listed as "female." Dr. L. H. Dennis, AVA executive director, remarked the other day that by the end of the year half the VEWPW trainees may be women. Certainly the facts bear out this prediction. From a low percentage of 4.2 women in training in December, 1941, the figure jumped to 17.2 in April, 1942. By the end of May the percentage of women to men in training reached 20. And it is still going up.

The U. S. Employment Service, meanwhile, issued special instructions to all its 1,500 local offices to make every effort to refer large numbers of "minority" members to training courses and to find jobs for them as soon as trained.

● It will not be unusual soon to see horny-handed farmers bring their plows, harrows, tractor parts and other farm machinery for repair to school shops. In continuing what used to be the out-of-school rural youth program, Congress extended the benefits of vocational training to adult farmers. At the same time Congress endorsed the food-for-freedom program by declaring that courses shall be conducted in the "repair, operation and construction of farm machinery essential to the growing of farm commodities."

Congress blessed the program with $15,000,000 and a new name—Rural War Production Training.

● Don't be surprised if, within the coming weeks, federal officials take steps to ask shop teachers to:

Make plans for building or assembling gliders and glider parts.

Begin a campaign to build models of ships, along the lines of the successful airplane model building program.

Take the brunt of a nation-wide school scrap-salvage campaign, on the theory that school shops have considerable metal scrap worth conserving and shop teachers know what should be disposed of and what should not.

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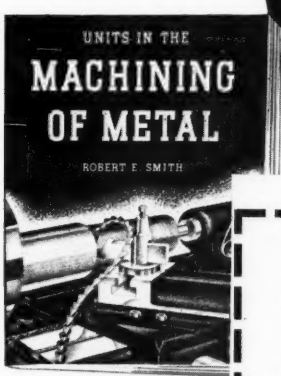

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